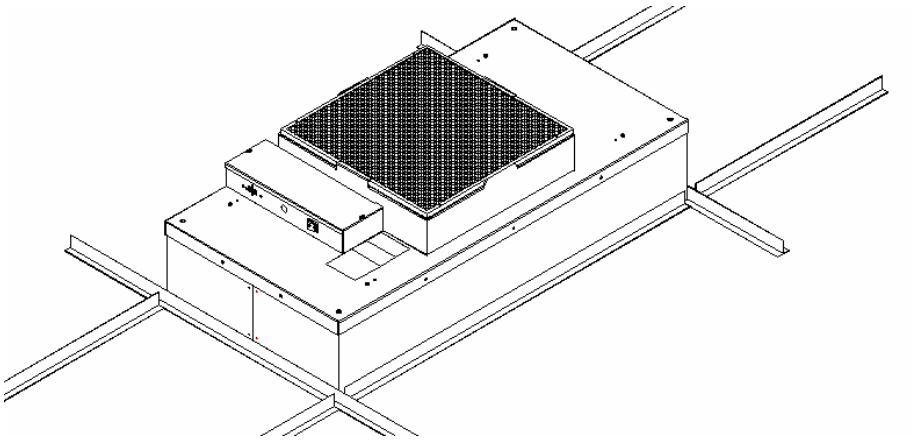
***** READ AND SAVE THESE INSTRUCTIONS *****

MAC 10® *LE-AC* FAN FILTER MODULE INSTALLATION AND SERVICE MANUAL

STANDARD, RSR, RSRE MODELS



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Envirco, U.S.A.

US Patents 4,560,395 and 5,470,363 Other patents issued and pending in foreign countries

Version1
Updated 2.5.11

Critical operation conditions of the MAC 10

1. Touching of the HEPA filter will damage it, voiding the warranty on the filter. The screen is only to protect against an accidental 'touch' of the filter. Never place a hand or tool on the filter. Never lie filter face flat down on a surface always have filter on its side or back to protect from damage.
2. Prior to powering the unit, verify that the unit has been plugged into the correct voltage. The serial number label on the top of the Mac 10 unit has the required voltage.
3. For reorder prepossess the Mac 10 part number and serial number should be recorded. This information is located on the serial number label, located adjacent to the electrical box. If you can't located the Sales Order Number please contact Envirco for this information.

Part Numbers Covered by this Manual

11194-XXX	Mac 10 LE AC 2x4 (600x1210mm) Standard Filter
	Mac 10 LE AC 2x4 (600x1210mm) RSR/E Filter

Note: A 'Z' in the part number indicates that the unit is special. This may indicate a size change from standard or a special filter. Please contact the factory for part numbers if this is the situation.

CAUTION

TO REDUCE THE RISK OF INJURY TO PERSONS, INSTALL FAN AT LEAST 2.1M (7 FEET) ABOVE THE FLOOR

READ AND SAVE THESE INSTRUCTIONS

WARNING!

TO REDUCE THE RISK OF FIRE, ELECTRICAL SHOCK, OR INJURY TO PERSONS, OBSERVE THE FOLLOWING :

A. Installation work and electrical wiring must be done by qualified person(s) in accordance with all applicable codes and standards, including fire-rated construction.

B. When cutting or drilling into wall or ceiling, do not damage electrical wiring and other hidden utilities.

C. If this unit is to be installed over a tub or shower, it must be marked as appropriate for the application.

D. Use this unit only in the manner intended by the manufacturer. If you have any questions, contact the manufacturer:

ENVIRCO
101 McNeill Road
Sanford, NC 27330
Tel: (919) 775-2201
Tel: (800) 884-0002
Fax: (800) 458-2379
Email: info@envirco.com

ASIAN SALES
Building #1
200 Middle Suhong Road
Suzhou, Jiangsu
PRC 215021
Tel: (86) 512 6258 0031
Fax:(86) 512 6258 7180

Europe, Middle East & Africa (EMEA)
TRION Div of Ruskin Air Management Ltd
European Operations
The Cavendish Center Winnall Close
Winchester Hampshire
S023 OLB, UK
Tel: +44 (0) 1962 840465
Fax: +44 (0) 1962 828619

E. Before servicing or cleaning unit, switch power off at service panel and lock service panel to prevent power from being switched on accidentally.

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1 INSTALLATION

Note: The MAC 10 LE-AC Fan Filter Unit is completely assembled at the factory with the exception of the optional ¼" (0.64 cm)-20 eyebolts, which can be used when hanging the unit from an overhead structure.

Step 1. Carefully remove the unit from the shipping carton and inspect for any damage that may have occurred during transportation. (See Figure 1)

Step 2. Wipe down plastic bag and move unit into clean room. (Double bagging is available upon request.)

Step 3. If using rigidly supported grid (usually 2" (50 mm) or wider), raise unit through ceiling and lower onto the gasketed grid. If using a flexible grid (typically supported with wires) the unit must be secured to an overhead structure with eyebolts, s-hooks and chain or ¼-20 all thread. A roll of high-density gasket has been provided for use with ungasketed grids. Note: special size units are available to fit specific clean room grid systems.

Step 4. Have an electrician wire the unit to the appropriate voltage (115V, 220V, 277V AC), according to the wiring diagram in section IX and local electric codes. If optional power cord was purchased, plug unit into a grounded receptacle. The optional power cord is not acceptable for plenum installations.

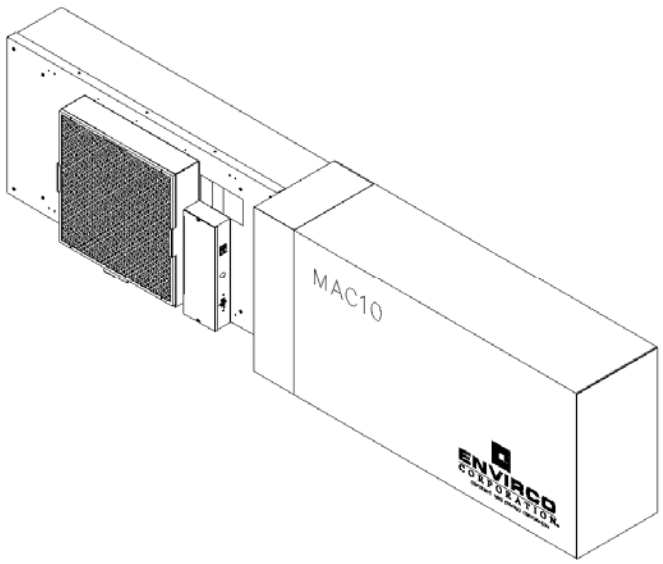


Figure 1 – Unit Uncrating

2 SERVICE: Cleaning the MAC 10 LE-AC Prefilter (foam)

WARNING!
Disconnect the unit from the electrical power source before attempting any service.

Tools Required: None

Note: *To keep the filter in top operating condition, washing the foam prefilter is recommended every three to six months.*

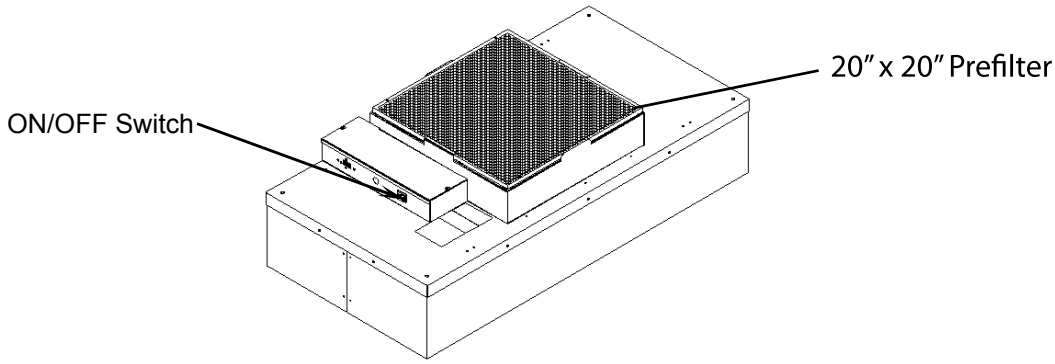
Step 1. To gain access to the prefilter, remove the ceiling panel next to the unit, if applicable.

Step 2. Switch the ON-OFF switch to the off position.

Step 3. Remove the prefilter from the snap-in frame. (See Figure 2)

Step 4. Clean the prefilter by hand washing in water with a mild detergent or by using a vacuum cleaner. Allow prefilter to dry completely before replacing.

Step 5. Reassemble by reversing the above steps.



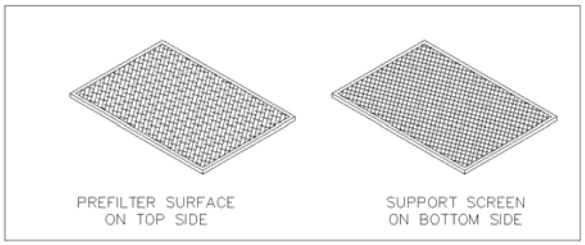


Figure 2 – Foam Prefilter Cleaning

3 SERVICE: Cleaning the MAC 10 LE-AC Prefilter (G4 Pleated Prefilter)

WARNING!
Disconnect the unit from the electrical power source before attempting any service.
Tools Required: None

Note: *To keep the filter in top operating condition replacing the pleated prefilter is recommended every twelve months or sooner.*

Step 1. To gain access to the prefilter, remove the ceiling panel next to the unit, if applicable.

Step 2. Switch the ON-OFF switch to the off position.

Step 3. Remove the prefilter from the snap-in frame. The beverage frame has slots that have to be depressed to release the filter from the prefilter housing (See Figure 3)

Step 4. After removing the new G4 pleated prefilter from the box, remove the die cut slots from the beverage board frame and install on prefilter bracket.

Step 5. Reassemble by reversing the above steps.

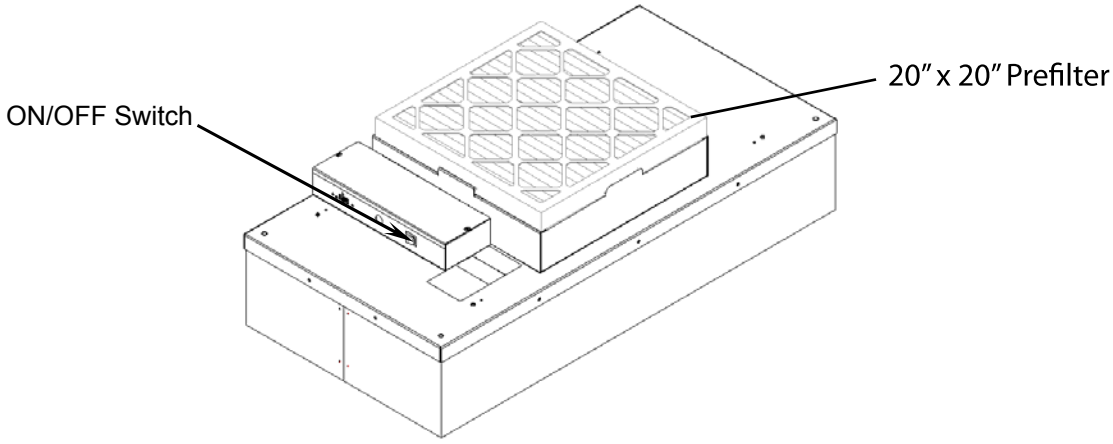


Figure 3 – G4 Prefilter Replacement

4 SERVICE: Removal and Replacement of the HEPA/ULPA Filter (Standard Unit)

WARNING!
Disconnect the unit from the electrical power source before attempting any service.
WARNING!
The Standard Filter is protected with an expanded metal face screen. This is never to be used to handle the filter. It is only for protection against an accidental touch of the filter. Only handle the filter by the frame.

Tools Required: **Phillips Head Driver, Battery Operated Drill with a 5/32 Drill Bit, Rivet Hand Tool, Ø5/32 aluminum rivet grip range .126-.187**

Step 1. Remove unit from ceiling.

Step 2. Remove the 10 screws holding the HEPA/ULPA filter to the lid assembly.

Step 3. Lift the lid assembly off the HEPA/ULPA filter (see Figure 3). Remove Filter deflectors using 5/32 drill bit. Keep filter deflectors to install in new filter. Discard the used filter as per requirements of the applicable regulations. Carefully install the filter deflectors into the new filter using the 5/32 rivets. Do not touch or place the filter deflectors on the HEPA/ULPA media pack. This could cause tears in the filter pack.

Note: *Before replacing with a new HEPA/ULPA filter, carefully inspect the new filter for any visible damage. Also inspect the gasket in the "tee" bar to insure a tight seal. Replace as necessary.*

Step 4. Replace with the new HEPA/ULPA filter and assemble by reversing the above steps.

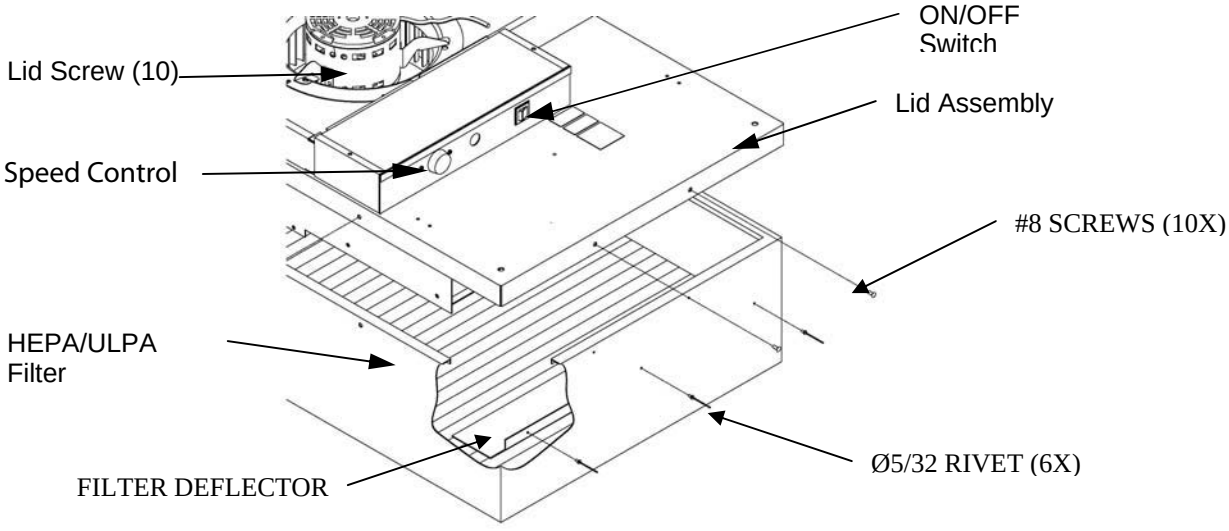


Figure 4 – Standard Filter Replacement

5 SERVICE: Removal and Installation of the Room Side Replaceable Gel Seal Filter (RSR/RSRE)

WARNING!
Disconnect the unit from the electrical power source before attempting any service.

WARNING!
The RSR Filter is protected with an expanded metal face screen. This is never to be used to handle the filter. It is only for protection against an accidental touch of the filter. Only handle the filter by the frame.

Tools Required:	**Phillips Head Driver**
	3/16" hex head wrench
Manpower Required:	**2**

Step 1. Remove the diffuser screen by removing the 6 each 10-32x1/2 screws.

Step 2. Loosen the six 1/4x20 socket head screws far enough to rotate the filter clip 90°. The filter will not drop during this operation. Slowly pull the filter away from the knife-edge seal, taking care not to touch the filter face during this operation. It is important to pull the filter slowly away from the seal, so that the gel remains in the filter gel track.

Step 3. Inspect filter for visible damage, if damaged set aside for replacement or repair.

Step 4. Inspect the gel seal, if reinstalling the removed filter. Determine if the gel has lost its ability to seal, if so repair the gel.

Step 5. Place the filter against the filter-sealing surface of the RSR unit. Install filter clips and screws. The clips can be rotated and angled into place. Using the clips as a lever the filter can be seated. It is recommended to work either clockwise or counter clock wise around the filter, raise the filter into the gel.

Step 6. Reinstall screen.

(Referenced by Figure 5 on page 9)

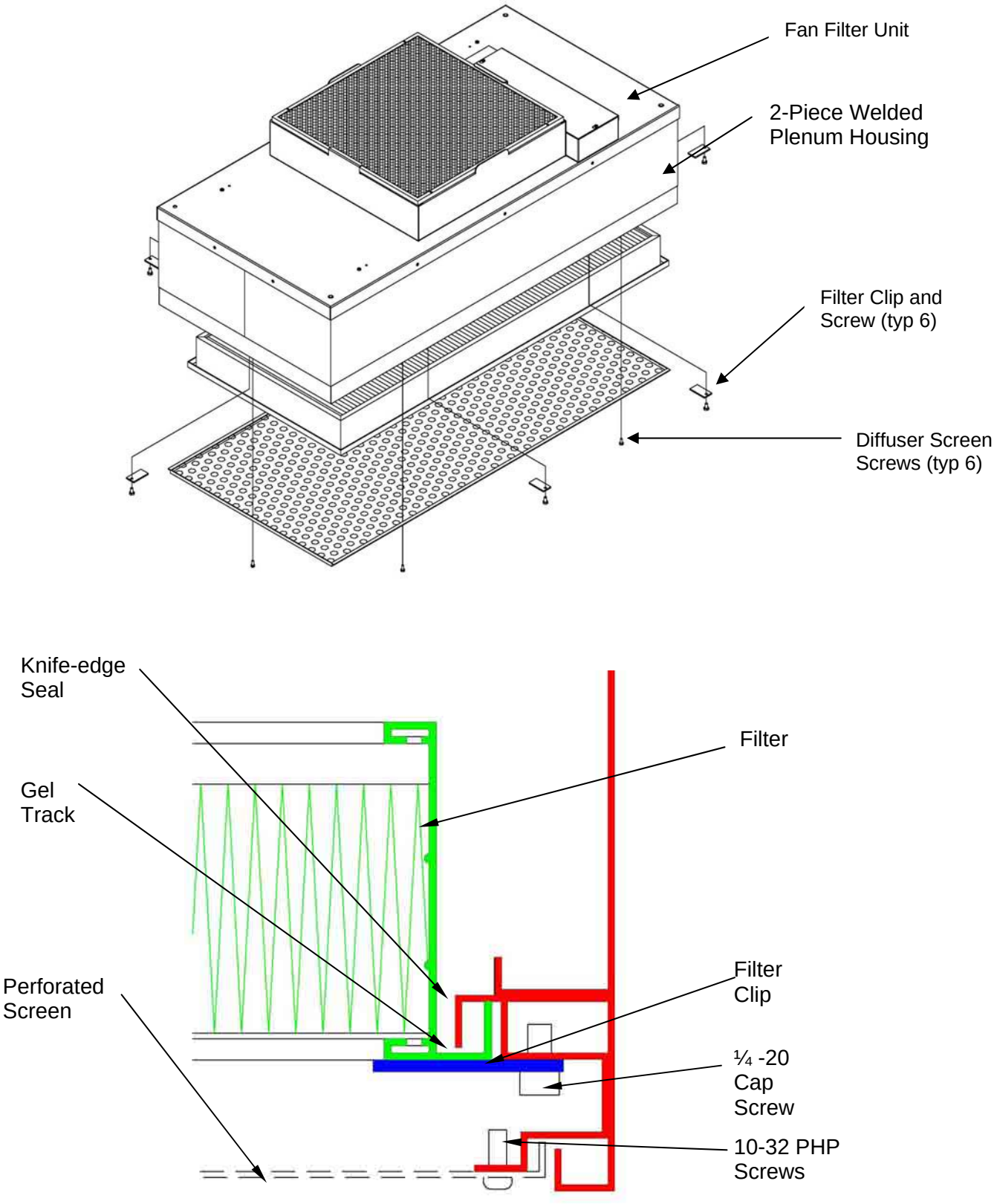


Figure 5 – RSR Sheet Metal Filter Replacement

6 SERVICE: Removal and Installation of the Motor (Standard and RSR models)

WARNING!
Disconnect the unit from the electrical power source before attempting any service.

WARNING!
Electrical service should be performed by licensed electricians or authorized ENVIRCO service technicians.

Tools Required: **Phillips Head Driver**
3/8" (10mm) Hex Head Wrench
Pliers
5/32"(0.40 cm) Allen wrench

Step 1. To gain access to the motor, remove the ceiling panel next to the unit, if applicable.
Step 2. Switch the ON-OFF switch to the off position.
Step 3. Remove the prefilter off the prefilter frame. (See Section II)
Step 4. Loosen the electrical box cover screws (2), and slide/lift off cover. (Figure 6)
Step 5. Make note of all wire locations for reinstallation later.
Step 6. Disconnect 5-pin and 16-pin wire harnesses from the electrical box housing.
Step 7. Remove the eight screws to free the motor/blower assembly from the lid assembly. If using power drivers, set the unit to a low torque setting to avoid stripping the sheet metal screws. (See Figure 6)
Step 8. Using an adjustable wrench loosen the two set screws that attach the blower wheel to the motor shaft.
Step 9. Mark the location of the motor support bracket (belly band), then loosen the bolt just enough to allow the motor support bracket to slid off the motor.
Step 10. Using the removed motor, mark the new motor with the location of the motor support bracket.
Step 11. Replace with the new motor and reassemble by reversing the above steps 1-8. Set the spacing at 0.25" (6.35 mm) clearance between the blower and the upper motor plate/prefilter frame. This will give a 0.11" overlap between the venturi ring and the blower

(Referenced by Figure 6 on page 11)

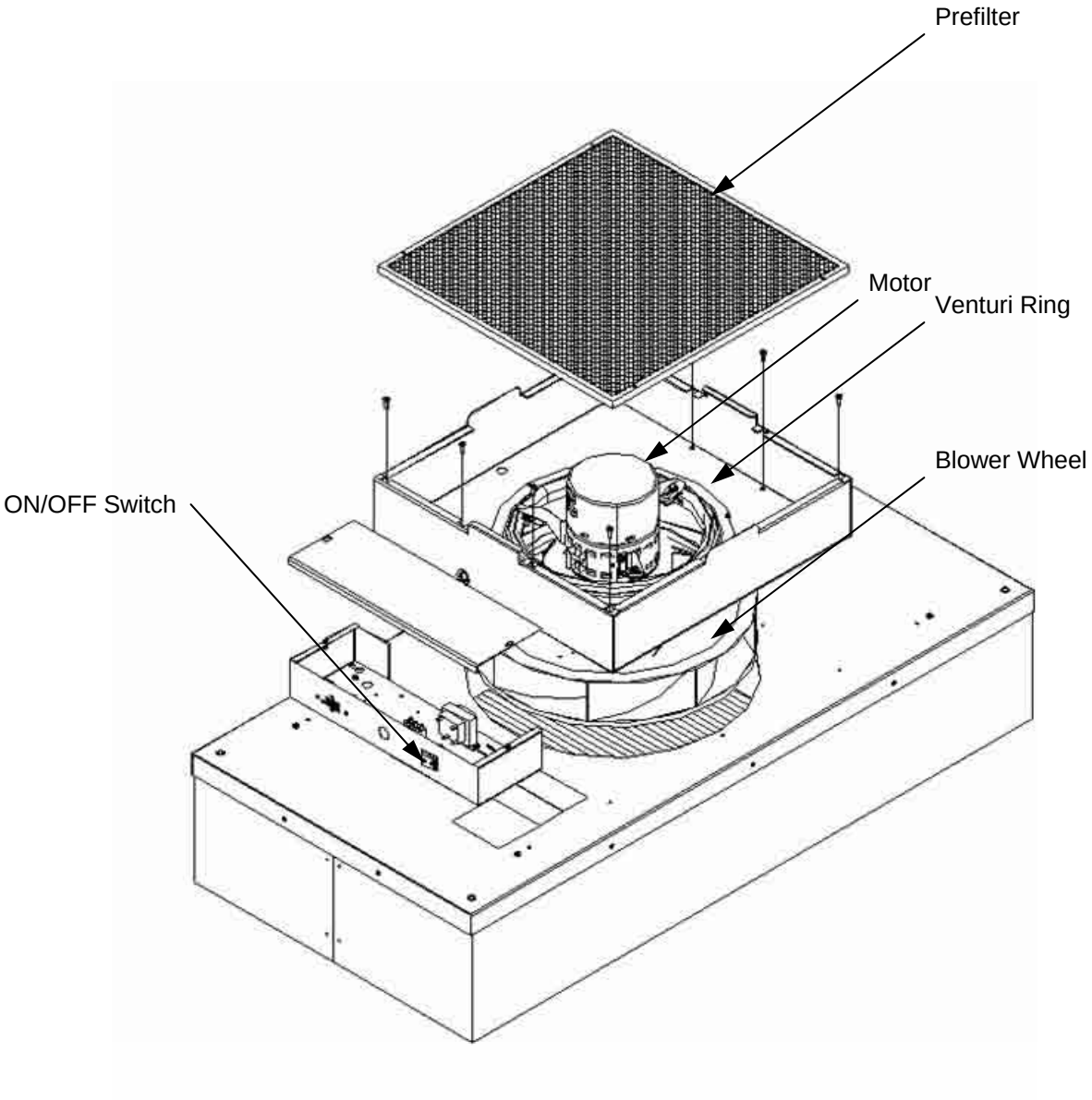


Figure 6 – Motor Replacement

7 SERVICE: Removal and Installation of the RSRE Motor

WARNING!
Disconnect the unit from the electrical power source before attempting any service.

WARNING!
Electrical service should be performed by licensed electricians or authorized ENVIRCO service technicians.

Step 1. To gain access to the motor, remove the gel seal filter (see Section III).

Step 2. Prior to removing motor/blower assembly, remove blower wheel to expose motor connectors on motor. Using an adjustable wrench loosen the two set screws that attach the blower wheel to the motor shaft. Disconnect the five and sixteen pin connectors from the motor.

Step 3. While supporting the motor blower assembly from below, remove the six screws on the underside of the venturi ring and lower the assembly. (See Figure 7). Note the baffle does not have to be removed to remove the motor/blower assembly.

Step 4. Before removal of the motor mount bracket, measure the precise location of the bracket on the motor. Remove the bracket.

Step 5. Replace with the new motor and reassemble by reversing the above steps. Set the location of the motor mount bracket as measured (see above Step 6). Set the spacing at 0.25” (6.35 mm) clearance between the blower and the upper motor plate/prefilter frame creating a 0.11” (2.80 mm) overlap between the wheel and the venturi ring. When reinstalling the assembly, align the plate to insure that the leads will reach the electrical box.

(Referenced by Figures 7 & 8 on page 13)

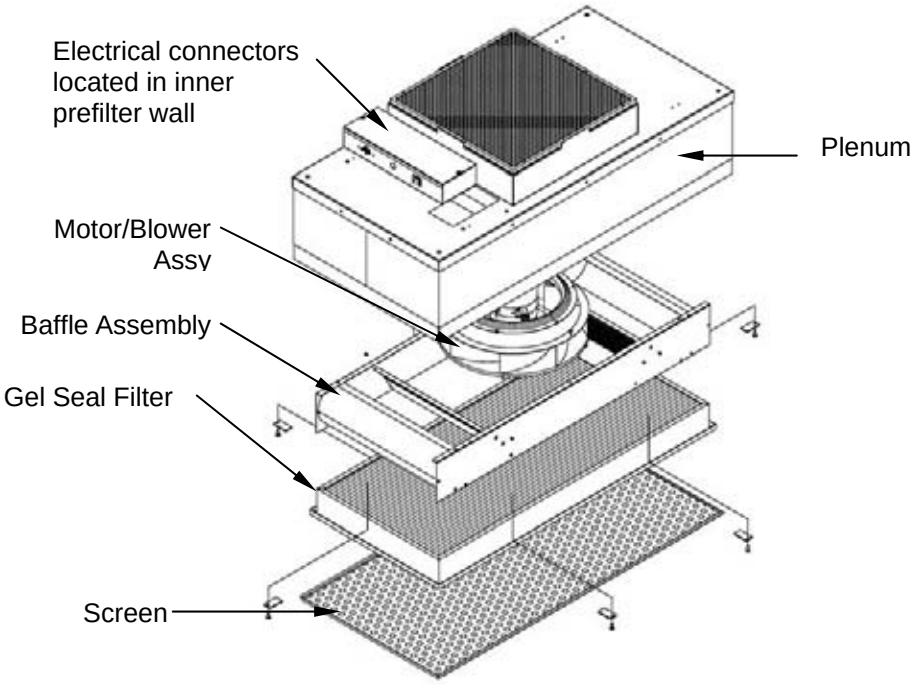


Figure 7 – RSRE Motor Replacement

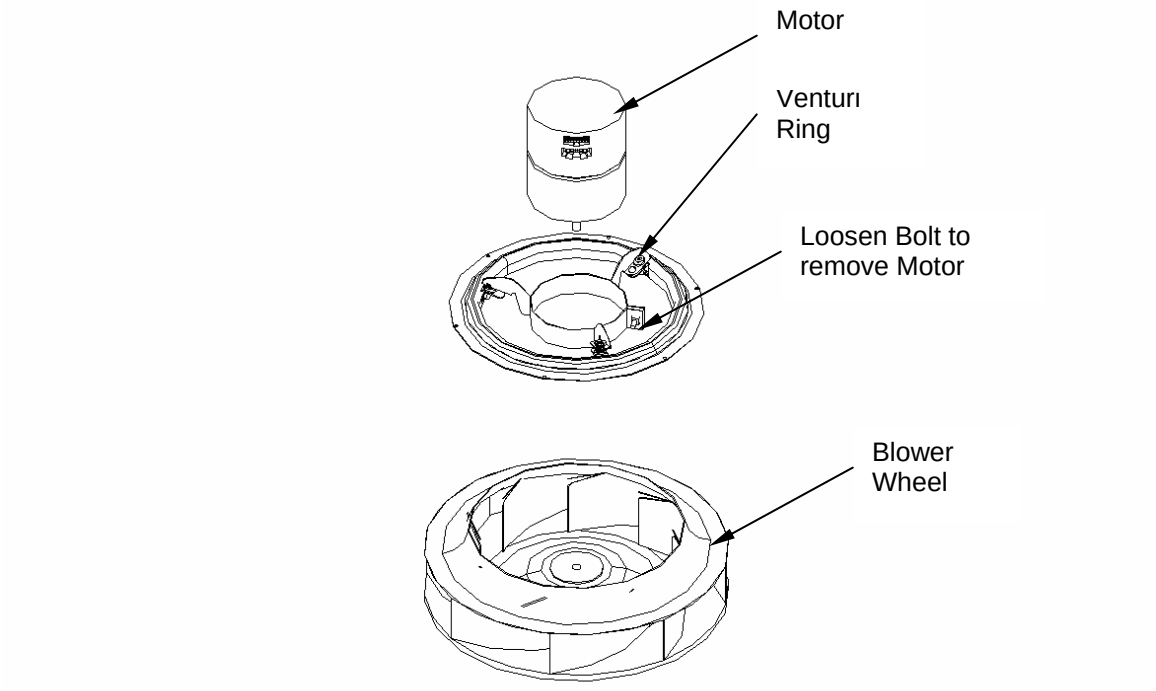


Figure 8 –Motor Blower Components

8 ON/OFF Switch - Speed/Airflow Adjustment

All MAC 10 units are equipped with a three-position rotary switch, which is located on the side of the electrical box. (See Figure 8)

Recommended fan speed during initial start-up and operation is the “LOW” speed. As airflow eventually decreases due to filter loading, fan speed may be increased by moving the rocker switch to the top or “MEDIUM” position, and finally to the “HIGH” position. Periodic airflow velocity readings (Per I.E.S.T.Specifications) should be conducted to determine the filter condition and appropriate fan speed setting.

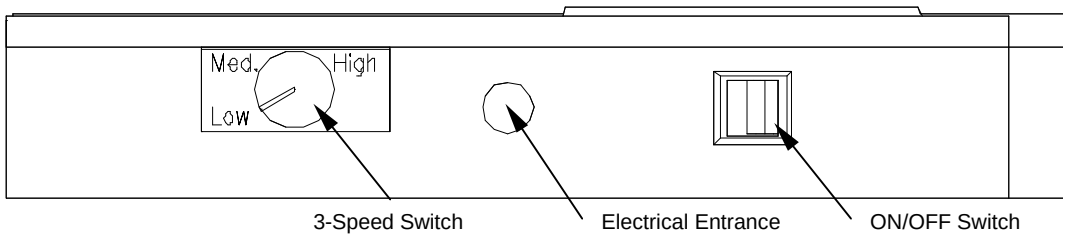


Figure 8 – 3 Speed Switch Adjustment

9 Trouble Shooting:

Unit is not adjustable

Step 1. Verify that rotation of the knob on the visual speed control does not change the RPM or Flow Index display on the unit. If rotating does nothing, remove the electrical box cover and remove the 4-pin connector from the Visual Speed control and install in 180 degrees rotated. Again adjust the knob. The 4 pin connector is on the 18" (31.8 mm)white conductor.

Low Air Velocity

Step 1. Check prefilter media; replace or clean as necessary.

Step 2. Adjust visual speed control for higher blower output.

Step 3. Check power supply for proper voltage, amperage and distribution frequency.

Step 4. Replace HEPA filter if the air velocity remains low.

High Air Velocity

Step 1. Adjust visual speed control for lower blower output.

Non-Laminar Flow and/or Excessive Contamination

Step 1. Insure that no large obstructions are upstream of airflow pattern.

Step 2. Determine that no other air-moving devices are operating in or around clean room which disrupt room's airflow pattern.

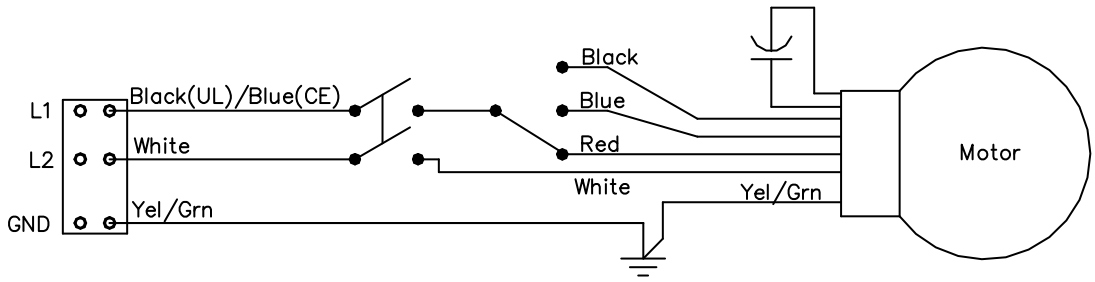
Step 3. Check air velocity and if low, conduct the "Low Air Velocity" procedure outlined above.

Step 4. Conduct smoke and photometer test on HEPA filter. Seal or replace HEPA filter as necessary.

Contact Technical support at:

ENVIRCO
101 McNeill Road
Sanford, NC 27330, U.S.A.
Tel: (919) 775-2201
Tel: (800) 884-0002

10 MAC 10 LE-AC Wiring Diagrams



Mac 10 LE-AC Three Speed Wiring Diagram

Figure 11 – Wiring Diagram Speed Control

11 MAC 10 LE-AC Replacement Parts List:

ACLE PARTS	PART #
Grommet	63271
Motor 120V	63764-001
Motor 220V	63764-002
Motor 277V	63764-003
Motor Mount Clip	38511-001
Venturi Ring	64115
Blower Wheel	64015
Motor/Blower Assy	
120V	24511-001
220V	24511-002
277V	24511-003
Capacitor	61485
Capicitor Boot	60126
Rocker Switch	63739-002
3 spd switch	63775
Foam Pre-filter (20X20)	62981-038
30/30 Pre filter (20X20)	64125-001

All filter part numbers are based on the standard Mac 10 sizes (2x4 – 23.63x47.63). If the unit in question is not this size or the part number includes a “Z” contact the factory for replacement filter information.

STANDARD FILTERS PART NUMBERS
69600S-001HAPXX FILTER - HEPA 2X4 9" FRAME
69600S-001UAPXX FILTER - ULPA 2X4 9" FRAME

WELDED RSR GEL SEAL
69601-001H FILTER - HEPA 21X45X3.5 GEL SEAL
69601-001U FILTER - ULPA 21X45X3.5 GEL SEAL

Optional Accessories:
Fluorescent lighting
Ionizing bar
A/C intake collar: 20x20 (10″/254mm)
20x20 (12″/304.8mm)
20x20 (14″/355.6mm)
ULPA Filter (Standard and RSR)

Replacement parts are available through your authorized Envirco representative. If you cannot locate a representative in your area, contact Envirco Parts Dept. at:

ENVIRCO
101 McNeill Road
Sanford, NC 27330, U.S.A.
Tel: (919) 775-2201
Tel: (800) 884-0002
Fax: (800) 458-2379

12 Warranty

LIMITED WARRANTY: Unless otherwise expressly stated in Envirco's published specifications for the Goods, Envirco warrants that that Goods are free from defects in material and workmanship, except for services which are warranted to be performed in a competent and diligent manner in accordance with any
mutually agreed specifications. The foregoing warranty shall apply for eighteen (18) months from the date of shipment from Envirco's facility, except for services for which the warranty shall apply for ninety (90) days from the date of performance (the "Warranty Period"). Provided Buyer informs Envirco in writing of any breach of warranty prior to the expiration of the applicable Warranty Period, Envirco shall, as its sole obligation and Buyer's sole and exclusive remedy for any breach of this warranty, repair or replace/re-perform the Goods which gave rise to the breach or, at Envirco' option, refund the amounts paid by Buyer for the Goods which gave rise to the breach. Any repair, replacement or re-performance by Envirco hereunder shall not extend the applicable Warranty Period. The parties shall mutually agree on the specifications of any test to determine the presence of a defect. Unless otherwise agreed upon by Envirco in writing, Buyer shall bear the costs of access, de-installation, re-installation and transportation of Goods to Envirco and back to Buyer. These warranties and remedies are conditioned upon (a) the proper storage, installation, operation, and maintenance of the Goods and conformance with the proper operation instruction manuals provided by Envirco or its suppliers or subcontractors, (b) Buyer keeping proper records of operation and maintenance during the applicable Warranty Period and providing Envirco access to those records, and (c) modification or repair of the Goods only as authorized by Envirco. Envirco does not warrant the Goods or any repaired or replacement parts against normal wear and tear or damage caused by misuse, accident, or use against the instructions of Envirco. Any modification or repair of any of the Goods not authorized by Envirco shall render the warranty null and void. EXCEPT AS EXPRESSLY SET FORTH HEREIN, ENVIRCO MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, NON-INFRINGEMENT OR FITNESS FOR A PARTICULAR PURPOSE WHICH ARE HEREBY DISCLAIMED TO THE EXTENT PERMITTED.

13 TESTING

Each MAC 10 LE-AC filter unit is thoroughly tested at the factory before shipment. However, because of the "rigors" of shipping, ENVIRCO encourages its re-test after installation. Additional, for large installations it is recommended to bench test 5% of the units prior to installation.

ENVIRCO recommends that the customer contact an independent organization, with technicians trained and experienced in performance evaluation and maintenance of clean air equipment.

Some of the testing procedures performed on the MAC 10 LE-AC include PSL challenge of HEPA/ULPA filters to assure specified performance, along with air velocity measurement and adjustment tests. No DOP is used on Mac 10 Filters, unless requested.